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Molecular Phylogenetic Analysis of Japanese Soil-dwelling *Mundochthonius* Pseudoscorpions (Pseudoscorpiones: Chthoniidae)

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The pseudoscorpion genus *Mundochthonius* is currently composed of 24 species across the Holarctic region. In Japan, three soil-dwelling *Mundochthonius* species have been described: *M. japonicus* Chamberlin, *M. kiyoshii* Sakayori, and *M. itohi* Sakayori. These taxa are distinguished from each other using typical characteristics of pseudoscorpion classification, i.e., body length, the chaetotaxy of carapace and abdominal tergites, and pedipal-pal femur morphology. However, recent taxonomic and phylogenetic studies of chthonioid pseudoscorpions have suggested that these morphological characteristics are not always reliable diagnoses. Therefore, the classification of Japanese soil-dwelling *Mundochthonius* species should be reconsidered. Here, we collected *Mundochthonius* specimens from the entire distributional range of the genus in Japan (Hokkaido to Kyushu region), including all type localities, and examined the phylogenetic relationship among them using partial sequences of mtDNA COI and nDNA 18S rRNA genes.

Molecular phylogenetic analysis showed the existence of more than three lineages of Japanese soil-dwelling *Mundochthonius* (Figure). *Mundochthonius kiyoshii* and *M. itohi* each formed their own monophyletic group with high bootstrap values. On the other hand, *M. japonicus* was comprised of five polyphyletic lineages (*M. 'japonicus'* sp. A, B, C, D, and E) indicating inconsistency between the current morphological identification and genetic lineages. Morphological analysis among the five genetic lineages suggested that the genetic lineages *M. 'japonicus'* sp. A, D, and E might be distinguished from other lineages based on some morphological characteristics such as carapacal length, spinneret and inner teeth morphology of chelicera, and length ratio between femur and tarsus of the first leg. Therefore, further morphological analysis among genetic lineages may provide new insight into the classification of *Mundochthonius* puseudoscorpion.

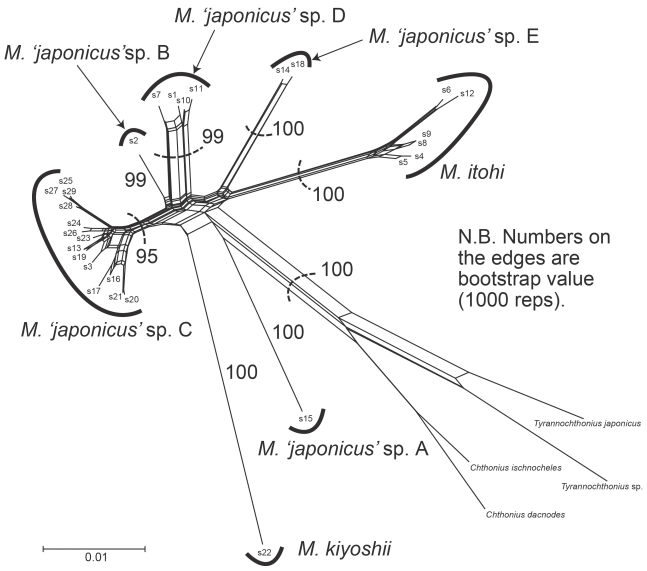

Figure Neighbor-net tree based on the haplotypes of nDNA 18S rRNA gene.